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Psychiatry Research

Correlates of sedentary behavior among adults with hazardous drinking habits in six low- and middle-income countries

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Abstract

Sedentary behaviour is associated with poor mental health, diabetes and cardiovascular disease, all of which are a concern among hazardous drinkers. Little is known about sedentary behaviour and it's correlates in hazardous drinkers, particularly in low- and middle-income countries. We investigated correlates of sedentary behaviour among community-dwelling adults aged ≥18 years with hazardous drinking patterns in six low- and middle-income countries. Cross-sectional data were analyzed from the World Health Organization's Study on Global Ageing and Adult Health. Hazardous drinking was defined as consuming >7 (females) or >14 (males) standard drinks per week. Associations between time spent sedentary and a range of correlates were examined using multivariable linear and logistic regression. The mean time spent sedentary in 2,142 individuals with hazardous drinking patterns (mean age=45.7 years; 13% female) was 216±135 min/day. Nine percent (95%CI=6.1%-13.2%) were sedentary for ≥8 hours per day. Living in an urban setting and unemployment were strong sociodemographic correlates of being sedentary for ≥8 hours per day. From a health-related perspective, weak grip strength, stroke and disability were associated with increasing time spent sedentary. The current data provides important guidance for future interventions across low- and middle-income countries to assist hazardous drinkers to reduce sedentary behaviour.

Keywords: alcohol; sitting; lying; correlates, hazardous drinking, sedentary behaviour

1. Introduction

Hazardous use of alcohol has been associated with approximately 3.3 million deaths every year (or 5.9% of all deaths), and 5.1% of the global burden of disease is attributable to alcohol consumption (WHO, 2014). The threshold for hazardous consumption arising from regular alcohol use has been established by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) as more than 7 standard drinks per week for women, and more than 14 per week for men (Force, 2004). People who engage in hazardous drinking, including those with alcohol use disorders, are at increased risk of poor physical health (e.g. diabetes, metabolic syndrome, cardiovascular diseases) (Patra et al., 2010; Vancampfort et al., 2016a; Vancampfort et al., 2016b) and mental illness (Zhai et al., 2015).

Treatments for hazardous drinking include pharmacotherapy, cognitive behavioral and behavioral therapies, motivational enhancement therapy and mutual peer support intervention (Connor et al., 2016). Despite advancements in the different approaches, pharmacotherapy has unwanted side-effects and compliance is often low (Reid et al., 2005). Also psychotherapeutic treatment have so far shown little effect, with as many as 80% relapsing following a period of abstinence (Satre et al., 2004). Perceived stigma with conventional treatments may also limit help-seeking (Andréasson et al., 2013). Considering this, there is a need for novel adjunctive interventions that may help in alcohol abstinence and also address the poor physical and mental health of this neglected population.

Robust evidence exists that physical activity improves somatic and mental health of people with alcohol use disorders (Hallgren et al., 2017) as it significantly reduces depressive symptoms (SMD=-0.867, p=0.006) and improves physical fitness (SMD=0.564, p=0.01) in this population. In addition, although physical activity does not reduce self-reported daily alcohol consumption (standard mean difference, SMD =-0.886, p=0.24), it may reduce average weekly consumption (SMD=−0.656, p=0.04) (Hallgren et al., 2017).

In recent years, growing evidence demonstrates that excessive sedentary time may be harmful to health, independent of a person's physical activity level (Lee et al., 2012; Owen et al., 2010) including an increased risk of cardio-metabolic abnormalities (Biswas et al 2015) and depression (Zhai et al., 2015). Time spent in sedentary behaviour can be defined as any behaviour during waking hours characterised by energy expenditure ≤ 1.5 metabolic equivalent tasks while in a sitting or reclining posture (Tremblay et al., 2017). Considering the beneficial effects associated with reducing sedentary behaviour independent from increasing physical activity levels (Keadle et al., 2015; Matthews et al., 2015), there is a particular need to diminish sedentary behaviour in vulnerable populations. While the association between alcohol consumption and physical activity in the general population is complex (Leasure et al., 2014), empirical evidence (Sari et al., 2015) suggest that people with emerging or established alcohol use problems are often physically inactive with below average fitness. Thus, identifying correlates of sedentary behaviour in people with hazardous drinking patterns can aid in the development of successful sedentary behaviour interventions, by highlighting the potentially modifiable correlates that may bring about reductions in sedentary behaviour (e.g. physical environment), or identifying socio-demographic characteristics of specific subgroups most in need of intervention. Evidence from the general population has provided some support for

sociodemographic and health correlates of sedentary behaviour, including age, education, employment status, gender, body mass index (BMI), income, smoking status, attitudes and depressive symptoms (Rhodes et al., 2012). However, special attention should be given to vulnerable subpopulations, including individuals with hazardous drinking patterns, who are at increased risk of developing an alcohol use disorder, and in whom the antecedents and consequences of sedentary behaviour may differ (O'Donoghue et al., 2016; Prince et al., 2017).

To the best of our knowledge, studies on sedentary behaviour correlates in people with hazardous drinking habits are unavailable. In addition, very little is known about sedentary behaviour correlates in people in low- and middle-income countries in general. This is important as these countries are characterized by a suboptimal treatment of hazardous drinking habits (Patel et al., 2007), and often a lack of knowledge regarding the risks of sedentary behaviour (Pengpid et al., 2015; Vancampfort et al., 2017b). Information on correlates of sedentary behaviour in people with hazardous drinking habits in low- and middle-income countries could guide the design and delivery of targeted interventions in these countries.

Thus, given the aforementioned gaps within the literature, we aimed to assess correlates of sedentary behaviour among community-dwelling adults meeting the NIAAA criteria for hazardous drinking (Force, 2004) in six low- and middle-income countries.

2. Methods

2.1. The survey

The current analyses utilizes data from the Study on Global Ageing and Adult Health (SAGE) survey, an ongoing population-based longitudinal program under the auspice of the World Health Organization (WHO). All interested researchers may seek access to this dataset through the WHO website (http://www.who.int/healthinfo/sage/en/). Interviews and performance tests were undertaken between 2007 and 2010 in China, Ghana, India, Mexico, Russia, and South Africa, which were all low- and middle-income countries at the time of the survey according to the World Bank classification. Details of the survey methodology are provided elsewhere (Kowal et al., 2012). In brief, following a standard research protocol across countries, trained interviewers conducted face-to-face interviews using a standard questionnaire to collect information with either the use of a computer-assisted

personal interview or a paper and pencil interview depending on the setting. Standard translation procedures for the questionnaires were undertaken to ensure comparability between countries. Respondents who were unable to undertake the interview because of limited cognitive function were not included in the analysis. Sampling weights were calculated to adjust for the population structure as reported by the United Nations Statistical Division. Ethical approval was obtained from the WHO Ethical Review Committee and local ethics research review boards. Written informed consent was obtained from all participants. The survey response rate ranged from 51% (Mexico) to 93% (China).

2.2. Hazardous drinking

The amount of alcohol consumption per week was assessed by asking participants how many drinks of any 'standard' alcoholic beverages they had on each day of the past 7 days. Furthermore, we also calculated the average consumption of alcoholic drinks per week based on information pertaining to the past 12 months on (a) how frequently (on how many days) on average the participant had at least one alcoholic drink, and (b) how many drinks they had on average on the days they drank. A show card was used to illustrate what was meant by a standard drink. Based on these three questions, those who consumed >7 (females) or >14 (males) standard drinks in the past week or those who consumed this amount based on the average consumption per week in the past 12 months were considered to be hazardous drinkers (Force, 2004).

2.3. Sedentary behaviour

In order to asses sedentary behaviour, patients were asked in a single question to state how much time they spent usually (expressed in minutes per day) sitting or reclining in total including at work, at home, getting to and from places, or with friends (sitting at a desk, sitting with friends, travelling in car, bus, train, reading, playing cards or watching television). This did not include time spent sleeping. Sedentary behaviour is reported as a continuous variable (minutes per day) and also as a categorical [<8 or ≥8 hours per day (highly sedentary)] variable. The 8 hours cut-off was chosen as previous research indicated that being sedentary for 8 or more hours is associated with a higher risk for premature mortality (Ekelund et al., 2016).

2.4. Sociodemographic variables

These included age, sex, highest level of education achieved (completed secondary or less), wealth, marital status (married/cohabiting, never married, separated/divorced/widowed), setting (urban or rural, based on country-specific definitions, see eTable 1), and employment status (engaged in paid work ≥2 days in last 7 days: Y/N). Wealth quintiles were created based on country-specific income.

2.5. *Health behaviour*

These comprised of fruit and vegetable intake [≥2 (fruits) and ≥3 (vegetables) servings/day (adequate)] (Joint FAO/WHO Expert Consultation, 2003), and smoking (never, quit, current) (Koyanagi et al., 2015b).

2.6. *Mental health*

Anxiety was assessed by the question 'Overall in the past 30 days, how much of a problem did you have with worry or anxiety' with response alternatives: none, mild, moderate, severe, and extreme. In accordance with previous publications using a dataset with the identical question, those who answered severe and extreme were considered to have anxiety (Stubbs et al., 2017; Vancampfort et al., 2017a). Questions based on the World Mental Health Survey version of the Composite International Diagnostic Interview (Kessler and Ustun, 2004) were used for the diagnosis of past 12-month DSM-IV depression (American Psychiatric Association, 2000) (see eTable 2). The presence of mild cognitive impairment (MCI) was assessed with three tests (immediate recall, verbal fluency, and delayed recall) adapted from the CERAD (Sosa et al., 2009). Respondents were classified as having MCI if their test score was <lowest 7th percentile (approximately <-1.5SD) for their age and country in any of these tests (Garin et al., 2016). Those having severe or extreme problems with sleeping, such as falling asleep, waking up frequently during the night or waking up too early in the morning during the past 30 days, were considered to have sleep problems (Koyanagi and Stickley, 2015b).

2.7. Physical health

A stadiometer and a routinely calibrated electronic weighting scale were used to measure height and weight respectively. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared, and categorized as <18.5 (underweight), 18.5-24.9 (normal), 25.0-29.9 (overweight), and ≥30 (obese) kg/m^2. Participants who reported severe or extreme bodily aches or

pains in the past 30 days were considered to have bodily pain (Koyanagi and Stickley, 2015a): "Overall in the last 30 days, how much of bodily aches or pains did you have?". Chronic back pain was defined as having had back pain every day during the last 30 days (Stubbs et al., 2016b). Fall-related injuries in the past 12 months were assessed with questions on the presence of bodily injury and cause (Stewart Williams et al., 2015). The participant was considered to have hearing problems if the interviewer observed this condition (Y/N). Visual impairment was self-reported and defined as having extreme difficulty in seeing and recognizing a person that the participant knows across the road (Freeman et al., 2013). Lifetime diagnosis of diabetes or stroke was assessed by self-report. Blood pressure was measured three times with a one-minute interval with the use of a wrist blood pressure monitor. Hypertension was defined as having at least one of: systolic blood pressure ≥140 mmHg; diastolic blood pressure ≥90 mmHg; or self-reported diagnosis. For angina, arthritis, asthma, and COPD, the participant was considered to have the condition in the presence of self-reported diagnosis and/or symptom-based diagnosis using algorithms. Specifically, the validated Rose questionnaire was used for angina (Rose, 1962), and other previously validated symptom-based algorithms were used for arthritis, asthma, and COPD (Arokiasamy et al., 2017; Moussavi et al., 2007).

2.8. *Physical performance*

Grip strength was measured twice for both hands with the use of the Smedley's hand dynamometer. If the participant had any surgery in the last three months or arthritis or pain in the hand/wrist/arm, grip strength was not measured for that hand. Weak handgrip was defined as <30kg for men and <20 kg for women using the average value of the two handgrip measurements of the dominant hand (Cruz-Jentoft et al., 2010).

2.9. *Health status*

Self-rated health was evaluated by the question 'In general, how would you rate your health today?' Those who answered 'bad' or 'very bad' were considered to have poor self-rated health. Disability was assessed using activities of daily living (ADL) questions (Al Snih et al., 2010; Backholer et al., 2012; Katz et al., 1963) which included six questions with the introductory phrase "overall in the last 30 days, how much difficulty did you have" followed by: in washing your whole body?; in getting

dressed?; with moving around inside your home?; with eating (including cutting up your food)?; with getting up from lying down?; with getting to and using the toilet? Answer options were none, mild, moderate, severe, extreme/cannot do. ADL disability was a dichotomous variable where those who answered severe or extreme/cannot do to any of the six questions were considered to have limitations in ADL (Koyanagi et al., 2015a).

2.10. Social cohesion

As in a previous SAGE publication (Zamora-Macorra et al., 2017), a social cohesion index was created based on 9 questions on the participant's involvement in community activities in the past 12 months (e.g., attended religious services, club, society, union etc) with answer options 'never (coded=1)', 'once or twice per year (coded=2)', 'once or twice per month (coded=3)', 'once or twice per week (coded=4)', and 'daily (coded=5)'. The answers to these questions were summed such that higher scores indicated higher levels of social cohesion. Three groups were created based on the tertiles.

2.11. *Statistical analysis*

The difference in sample characteristics between those with and without hazardous drinking patterns was tested by Student's *t*-tests and Chi-squared tests for continuous and categorical variables, respectively. The other analyses were restricted to those who had hazardous drinking patterns. The difference in sample characteristics between those being sedentary less than 8 hours versus ≥8 hours was tested by Chi-squared tests. We used past literature as a guide to select the correlates of sedentary behaviour (Vancampfort et al., 2015). Multivariable logistic and linear regression was used to assess the association between each correlate (exposure) and sedentary behaviour (dependent variable) while adjusting for all other variables and country. The logistic regression analysis used the binary sedentary behaviour variable (i.e., <8 or ≥8 hours/day) as the dependent variable while the linear regression analysis used the continuous variable (min/day of sedentary behaviour) as the dependent variable. First, the sociodemographic correlates of sedentary behaviour were assessed by including all the sociodemographic variables (age, sex, education, wealth, marital status, setting, unemployment) in a single model. For factors other than sociodemographic variables (i.e., health and social cohesion), the variables were included individually in the models while adjusting for age and

sex and the other sociodemographic correlates which were identified as being significant in either the logistic or linear regression model (i.e., wealth, setting, unemployment). All regression analyses were adjusted for country. All variables were included in the models as categorical variables with the exception of the variable on min/day of sedentary behaviour (continuous variable). The sample weighting and the complex study design were taken into account in all analyses. Results from the regression analyses are presented as odds ratios (ORs, from logistic regression) or b-coefficients (from linear regression) with 95% confidence intervals (CIs). The statistical analysis was done with Stata 14.1 (Stata Corp LP, College station, Texas). The level of statistical significance was set at $P<0.05$.

3. Results

Out of 41,735 individuals aged ≥18 years, 2,142 persons with hazardous drinking patterns (China n=1187; Ghana n=389; India n=128; Mexico n=65; Russia n=152; South Africa n=221) could be identified. The mean (SD) age of the sample was 45.7 (10.9) years and 13.0% were females (see Table 1). The prevalence of high sedentary behaviour (i.e., ≥8 hours/day) was 9.0% (95%CI=6.1%-13.2%), while the mean (SD) time spent sedentary was 216 (135) min/day. There was no difference in prevalence of high sedentary behaviour (8.3%, 95%CI=7.0%-9.7%; P=0.71) nor time spent sedentary [206.9 (150.1) min day, P=0.38] compared with persons without hazardous drinking patterns

[n=39,593; mean age = 43.7 (14.6) years and 52.0% were females]. Persons without hazardous drinking patterns were more likely to be men (P<0.001) and older (P<0.001).

Based on unadjusted estimates, the prevalence of urban setting and unemployment were higher among individuals with high levels of sedentary behaviour (Table 1). The prevalence of other correlates are presented in Table 2.

The significant sociodemographic correlates of high sedentary behaviour based on the logistic regression model were being poorest (vs. richest), urban residence, and unemployment (See Table 3). The only significant sociodemographic correlate based on the linear regression analysis was unemployment.

As for correlates other than those of the sociodemographic domain, based on the logistic regression analysis, only weak grip strength was associated with high sedentary behaviour (see Table 4). Based on the linear regression analysis, individuals with weak grip strength, who had a stroke and those with disability were significantly more likely to spend time sedentary.

4. Discussion

To the best of our knowledge, the current study is the first to explore sedentary behaviour correlates in people with hazardous drinking habits. The current study shows that the mean time spent sedentary in 2142 individuals with hazardous drinking patterns (mean age=45.7 years; 13% female) was 216±135 min/day. Nine percent (95%CI=6.1%-13.2%) were sedentary for ≥8 hours per day. There was no difference in prevalence of high sedentary behaviour nor time spent sedentary compared with persons without hazardous drinking patterns, but making any firm conclusion is difficult as hazardous drinkers were more likely to be men and older. Living in an urban setting, being poorest

(vs. richest) and unemployment were sociodemographic correlates of more sedentary behaviour. Weak grip strength was associated with being sedentary ≥8 hours /day and also with increasing sedentary hours. Stroke and disability were associated with increasing time spent sedentary.

In our study, being unemployed was the strongest socio-demographic correlate for higher sedentary levels among hazardous drinkers. It is known that hazardous drinking increases the likelihood of unemployment and decreases the chance of finding and maintaining work, while hazardous drinking is more prevalent among the unemployed (Henkel, 2011). Next to the often physically demanding labour in particular in rural areas in low- and middle-income countries, active transport to and from work might be a underlying reason for less time spent sedentary in those who have a job. Speculatively, employment may offer opportunities to connect socially, enhance social functioning and consequently have more opportunity to be physically active (Sarkar et al., 2016).

Our study also showed, in contrast with evidence from the general population in a Western country (USA) (Trivedi et al., 2015), that those living in urban environments in low- and middle-income countries are more sedentary than those living in rural areas. In low- and middle-income countries urban employment (e.g. service-based jobs) is often more sedentary than rural employment (e.g., farming). Further, cities in low- and middle-income countries are often less safe, both in terms of traffic and crime, and this in turn is linked to higher motorized transport use, stress levels and depression (Smit et al., 2016), which might consequently be risk factors for hazardous drinking patterns as well. Evidence from prospective studies suggests that in cities, the built environment, which can be defined as the totality of places built or designed, including buildings, grounds around buildings, layout of communities, transportation infrastructure and parks and trails, (Handy, 2005) is an important determinant of TV viewing time and other screen-based sedentary behaviors (Sallis et al., 2012). A 4-year follow-up study (Ding et al., 2012) identified that adults in low-walkable neighborhoods increased their TV viewing time compared with those who lived in high-walkable neighborhoods. Given that much of the evidence on the relationship of environmental attributes with sedentary behavior comes from studies in Australia, Belgium and the USA (Sallis et al., 2012), the full range of these environmental exposures and their impacts on vulnerable groups such as people with hazardous drinking remain to be examined, especially in low- and middle-income countries (Oyeyemi et al., 2016).

Compared to the richest quintile, the poorest quintile was more sedentary. It might be the poorest quintile might have less access to active leisure time facilities, but this should be explored in more detail in future research.

When considering health related correlates, poorer handgrip strength was associated with being sedentary for ≥8 hours. Handgrip strength is an important objective measure of physical performance. Poor hand-grip performance in the general population has been associated with future depression (Veronese et al., 2017b), cognitive decline (Veronese et al., 2016), mortality (Veronese et al., 2017a) and frailty (Syddall et al., 2003). People who engage in hazardous drinking are known to be at increased risk of developing physical frailty (Buttery et al., 2015). Given the diverse range of adverse future events associated with poor handgrip strength, testing for this may serve as a screening tool to identify people at risk of worse outcomes among those with hazardous drinking. Moreover, to the best of our knowledge, our study is the first to investigate the association between objective muscular performance and sedentary behaviour among people with hazardous drinking. In the general population, most studies indicate that sedentary behaviour is only marginally (van der Velde et al., 2017) or not (Keevil et al., 2016; Wu et al., 2017) associated with physical function independent of physical activity levels. Nonetheless, physical activity, specifically activity incorporating resistance training, can improve physical performance (Liu and Latham, 2009) and this might be an important area for future research in those with hazardous drinking. Prospective research is however required to disentangle the directionality between the presence of hazardous drinking and sedentary behaviour and the effect on and of potential mediators such as muscular strength.

We also identified that individuals who had a stroke and those with disability were significantly more likely to spend time sedentary. Previous research has shown that increasing physical activity can delay and prevent the onset of disability and more broadly promote healthy ageing across the lifespan (Daskalopoulou et al., 2017). Clearly, people who have stroke or another disability may have challenges becoming mobile, and developing adapted physical activities for such populations may be an important first step. Previous research in Western populations has identified that people who have experienced a stroke engage in low levels of physical activity, and that low mood, sensorimotor dysfunction and difficulty walking are important correlates (Field et al., 2013). However, due to the cross-sectional nature of our study, it remains unclear whether a weaker muscle strength, stroke and disability are consequences or causes of sedentary behaviour. Moreover, it is known that

heavy alcohol consumption increases the relative risk of any stroke (Patra et al., 2010), and community-dwelling stroke survivors spent more time sedentary (Paul et al., 2016).

Whilst our data sheds a novel light on this neglected area, some limitations need to be considered. Next to the cross-sectional nature of our study, assessment of sedentary behaviour with a self-report questionnaire was a limitation. It is known that self-report is less accurate than objective assessments (Soundy et al., 2014; Stubbs et al., 2016a) as self-reported measures often underestimate sedentary behaviour levels (Ainsworth et al., 2006). We also acknowledge that 'hazardous drinking' is a terminology with different meanings globally. Nonetheless, we adopted the widely used NIAAA definition (Force, 2004). As the questionnaire used in our study did not include specific questions about the number of drinks consumed on a single occasion, we relied on the former criteria to identify hazardous drinkers; that is more than 7 (women) and 14 (men) drinks consumed per week during the past 12 months. Finally, we were unable to conduct country-wise analyses due to the small sample size in most countries. Future studies should assess whether there are any between-country differences in the correlates of sedentary behaviour among hazardous drinkers.

Despite these limitations, our data offer some evidence for some policy recommendations. Our data demonstrate that assisting people with hazardous drinking to find employment might be an important strategy to reduce their sedentary behaviour levels, which in turn might improve their physical and mental health status. From a clinical perspective, our current results suggest a need to consider muscle strength, perceived disability and somatic co-morbidities such as stroke in people with hazardous drinking habits.

In conclusion, our data illustrate that living in an urban setting, unemployment, a reduced muscle performance, perceived disability and somatic co-morbidities such as stroke are associated with sedentary behaviour levels among adults with hazardous drinking patterns in six low- and middle-income countries. These findings provide guidance for future interventions across low- and middle-income countries to help adults with hazardous drinking to reduce their sedentary behaviour. The impact of combining interventions to reduce sedentary behaviour with reducing hazardous alcohol drinking should be tested as a promising strategy for behavioral modification.

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Conflicts of interest

None.

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Table 1. Sociodemographic characteristics of the sample (overall and by presence or absence of highly sedentary behaviour)

Characteristic	Category	Overall n=2,142	Highly sedentary[a] No n=1,978	Yes n=164	P-value[b]
Age (years)	18-39	24.6	24.2	29.2	0.276
	40-64	68.3	69.3	58.9	
	≥65	7.1	6.6	11.9	
Sex	Female	13.0	13.0	13.3	0.952
Education	≥Secondary completed	52.9	52.7	54.0	0.899
Wealth	Poorest	17.3	16.2	28.0	0.382
	Poorer	15.3	15.6	12.7	
	Middle	22.7	22.3	26.3	
	Richer	22.0	22.1	21.6	
	Richest	22.7	23.8	11.3	
Marital status	Married/cohabiting	87.6	88.4	79.8	0.179
	Never married	6.3	6.1	9.0	
	Separated/divorced/widowed	6.1	5.5	11.2	
Setting	Urban	28.6	25.0	64.3	<0.001
Unemployed	Yes	22.7	19.3	56.9	<0.001

Data are column % based on weighted estimates.
[a] Those reporting 8 or more hours per day spent sedentary were considered to be highly sedentary.
[b] The difference in sample characteristics by sedentary behaviour was tested by Chi-squared tests.

Table 2. Sample characteristics of the health and social cohesion domains (overall and by presence or absence of highly sedentary behavior)

Characteristic	Category	Overall n=2,142	Highly sedentary[a] No n=1,978	Yes n=164	P-value[b]
Health behavior					
Fruit and vegetable consumption	Not adequate	56.3	56.1	58.6	0.836
Smoking	Never	22.3	22.8	16.9	0.632
	Current smoker	72.6	72.3	76.6	
	Former smoker	5.1	5.0	6.5	
Mental health					
Anxiety	Yes	1.9	2.0	1.0	0.371
Depression	Yes	1.2	1.2	0.9	0.639
Mild cognitive impairment	Yes	77.4	77.4	78.8	0.790
Sleep problems	Yes	5.8	4.7	16.5	0.086
Physical health					
BMI (kg/m^2)	Normal	66.6	67.9	53.5	0.208

	Overweight	21.9	20.6	34.7	
	Obese	4.3	4.5	2.7	
	Underweight	7.2	7.0	9.2	
Bodily pain	Yes	3.4	3.3	4.8	0.487
Angina	Yes	6.2	5.4	13.6	0.248
Arthritis	Yes	20.3	20.1	22.0	0.856
Asthma	Yes	3.1	3.1	2.5	0.646
Chronic back pain	Yes	2.8	2.6	5.0	0.246
COPD	Yes	9.2	9.0	11.3	0.675
Diabetes	Yes	2.9	2.9	1.8	0.490
Fall-related injury	Yes	4.2	4.2	4.2	0.995
Hearing problems	Yes	1.8	1.9	1.4	0.638
Hypertension	Yes	47.3	47.4	46.1	0.916
Stroke	Yes	1.0	0.9	2.0	0.449
Visual impairment	Yes	0.2	0.2	0.5	0.346
Physical performance					
Weak grip strength	Yes	26.3	24.9	40.9	0.147
Health status					
Poor self-rated health	Yes	12.9	11.7	25.1	0.109
Disability	Yes	1.1	1.0	1.7	0.529
Social cohesion					
Social cohesion (tertile)	1st (lowest)	32.5	31.8	39.2	0.155
	2nd	40.3	42.2	21.0	
	3rd (highest)	27.2	26.0	39.8	

Abbreviation: BMI Body Mass Index; Data are column % based on weighted estimates. [a] Those reporting 8 or more hours per day spent sedentary were considered to be highly sedentary. [b] The difference in sample characteristics by sedentary behaviour was tested by Chi-squared tests. * Significant when P<0.05

Table 3. Associations between sociodemographic factors and sedentary levels in people with a hazardous drinking patterns (n=2,142)

		Logistic regression		Linear regression	
		Outcome (highly sedentary)[a]		**Outcome (min/day sedentary)**	
Characteristic	**Category**	OR	95%CI	b-coefficient	95%CI
Age (years)	40-64 years vs. 18-39 years	0.50	[0.19,1.32]	0.86	[-36.89,38.60]
	≥65 years vs. 18-39 years	0.61	[0.17,2.21]	12.86	[-34.83,60.54]
Sex	Male vs. Female	1.88	[0.77,4.59]	27.99	[-11.59,67.57]
Education	≥Secondary completed vs. <Secondary completed	0.83	[0.31,2.24]	10.47	[-24.33,45.27]
Wealth	Poorer vs. Poorest	0.34	[0.09,1.27]	-27.16	[-72.44,18.13]
	Middle vs. Poorest	0.77	[0.25,2.43]	4.14	[-38.70,46.99]
	Richer vs. Poorest	0.64	[0.23,1.79]	-12.94	[-66.97,41.09]
	Richest vs. Poorest	0.26*	[0.07,0.92]	-0.77	[-48.30,46.75]
Marital status	Never married vs. Married/cohabiting	0.63	[0.26,1.57]	11.03	[-40.67,62.73]
	Separated/divorced/widowed vs. Married/cohabiting	0.83	[0.15,4.42]	-6.44	[-74.65,61.78]
Setting	Urban vs. Rural	4.63*	[1.56,13.72]	43.83	[-5.93,93.58]
Unemployed	Yes vs. No	4.88*	[1.68,14.24]	94.08**	[47.16,141.01]

Data are Odds Ratios OR, and OLS beta coefficients based on weighted estimates and 95% Confidence Intervals. [a] Those reporting 8 or more hours per day spent sedentary were considered to be highly sedentary. [b] The difference in sample characteristics by sedentary behavior was tested by Chi-squared tests. *P<0.01; **P<0.001.

Table 4. Associations of health variables and social cohesion with sedentary levels in people with a hazardous drinking patterns (n=2,142)

		Logistic regression		Linear regression	
		Outcome (highly sedentary)[a]		**Outcome (min/day sedentary)**	
Characteristic	**Category**	OR	95%CI	b-coefficient	95%CI
Health behavior					
Fruit and vegetable consumption	Not adequate vs. Adequate	1.22	[0.48,3.05]	-9.19	[-39.59,21.21]
Smoking	Current smoker vs. Never	1.16	[0.37,3.62]	19.89	[-15.46,55.25]
	Former smoker vs. Never	1.61	[0.44,5.86]	-20.89	[-66.07,24.30]
Mental health					
Anxiety	Yes vs. No	0.13	[0.02,1.11]	-35.84	[-101.61,29.94]
Depression	Yes vs. No	0.15	[0.02,1.45]	-21.40	[-107.84,65.05]
Mild cognitive impairment	Yes vs. No	1.52	[0.61,3.74]	3.62	[-23.46,30.70]
Sleep problems	Yes vs. No	1.81	[0.44,7.40]	38.09	[-85.08,161.25]
Physical health					
BMI (kg/m^2)	Overweight vs. Normal	2.10	[0.78,5.67]	11.09	[-31.73,53.92]
	Obese vs. Normal	0.36	[0.10,1.29]	-0.47	[-35.66,34.71]
	Underweight vs. Normal	1.15	[0.29,4.58]	32.45	[-18.61,83.51]
Bodily pain	Yes vs. No	1.12	[0.29,4.32]	3.32	[-72.12,78.75]
Angina	Yes vs. No	1.77	[0.35,9.00]	31.42	[-58.13,120.97]
Arthritis	Yes vs. No	1.00	[0.38,2.65]	-20.67	[-63.47,22.12]
Asthma	Yes vs. No	0.87	[0.34,2.21]	-38.35	[-85.72,9.03]
Chronic back pain	Yes vs. No	2.59	[0.68,9.90]	40.61	[-19.31,100.53]
COPD	Yes vs. No	0.77	[0.26,2.24]	-33.68	[-78.86,11.50]
Diabetes	Yes vs. No	0.26	[0.05,1.47]	22.51	[-45.96,90.98]
Fall-related injury	Yes vs. No	1.20	[0.13,11.36]	-1.38	[-56.52,53.77]
Hearing problems	Yes vs. No	0.58	[0.15,2.23]	2.48	[-41.97,46.92]

Hypertension	Yes vs. No	1.21	[0.44,3.33]	30.86	[-2.05,63.77]
Stroke	Yes vs. No	1.29	[0.11,15.51]	104.92**	[32.89,176.94]
Visual impairment	Yes vs. No	1.25	[0.16,9.83]	13.58	[-54.98,82.14]
Physical performance					
Weak grip strength	Yes vs. No	3.34*	[1.20,9.24]	50.85*	[9.89,91.81]
Health status					
Poor self-rated health	Yes vs. No	1.13	[0.27,4.78]	43.89	[-11.71,99.49]
Disability	Yes vs. No	1.83	[0.46,7.27]	123.60***	[57.13,190.08]
Social cohesion (tertiles)	2nd vs. 1st (lowest)	0.64	[0.20,2.02]	-24.50	[-57.75,8.75]
	3rd (highest) vs. 1st	2.71	[0.98,7.54]	-0.91	[-40.05,38.23]

Abbreviation: OR Odds Ratio; CI Confidence Interval; BMI Body Mass Index
Models are adjusted for sex, age, wealth, marital status, unemployment, and country.
[a] Those reporting 8 or more hours per day spent sedentary were considered to be highly sedentary.
* p<0.05, ** p<0.01, *** p<0.001

Highlights

- Unemployment is a strong correlate for sedentary behaviour in hazardous drinkers.
- Those living in cities are more sedentary than those living in rural areas.
- Weak grip strength, stroke and disability are associated with being sedentary.